FOREST PRODUCTS LABORATORY † FOREST SERVICE
U. S. DEPARTMENT OF AGRICULTURE

VENEER CUTTING AND DRYING PROPERTIES

ASPEN AND HYBRID POPLAR

The name aspen is commonly applied to two species of the genus Populus. These are quaking aspen (P. tremuloides) and bigtooth aspen (P. grandidentata). Several hybrids of this genus are also known as aspen or poplar. Aspens and poplars are characterized by rapid growth, generally small diameters and heights, and short lives. Their wood is light in color and weight (4) and uniform in texture (1).[1] It is quite straight grained, soft and easily worked, and it glues readily (7) and takes paint fairly well (2). It is used extensively for paper pulp, excelsior, matches, and lumber for food containers.

Description of Logs Tested

Rotary veneer cutting and drying tests were made on 53 bolts of Populus tremuloides from the Chippewa and Superior National Forests of northern Minnesota. These bolts were fairly round with concentric annual rings and with the pith approximately in the geometric center of the bolt. End checking was insignificant, and growth rate was fairly uniform. In addition, veneer cutting and drying tests were made on rotary and sliced veneer from bolts representing several hybrids. Veneer was cut from eleven bolts taken from seven trees in eastern Iowa. These were tentatively identified as hybrids of P. grandidentata and P. alba. Veneer was also cut from bolts from two trees from Massachusetts. These were identified as crosses between P. charkowiencis and P. robusta, and P. charkowiencis and P. caudina.

Pertinent information concerning all the trees tested is given in table 1. All the bolts were received at the Laboratory green and in good condition except those from Massachusetts, which were dry and showed evidences of decay.

On the basis of the test material, it appears that the main defects to be avoided in veneer logs are tension wood and knots. Veneer logs should be selected individually (5).

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[1] Underlined numbers in parentheses refer to literature cited at the end of this report.

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† Maintained at Madison 5, Wisconsin in cooperation with the University of Wisconsin

Preparation of Logs for Cutting

All of the test logs were similar in their veneer cutting properties. The following discussion applies to all of the test material unless specific exceptions are noted.

The flitches were slabbed on one side or on two opposite sides to prepare them for mounting on the slicer. As far as practical, areas of tension wood, crook, and knots were sawn off during the slabbing.

Bolts and flitches were conditioned to various temperatures from 40° to 200° F. Most of the veneer cut at room temperature was smooth, tight, and uniform in thickness. Tension wood (6) in some bolts and flitches caused fuzziness in the veneer. Fuzzy surfaces on thin veneer were reduced by cooling the bolts and flitches to 40° F. before cutting. Heating the bolts and flitches above room temperature increased the fuzziness of the veneer surfaces.

Lathe and Slicer Settings

The settings (3) given in table 2 were satisfactory for rotary cutting aspen veneer at room temperature. Suggested slicer settings are listed in table 3.

Veneer Drying

The moisture content of the green aspen veneer used in these tests varied from 93 to 127 percent with great variations present in each bolt and in sheets of veneer. The veneer was dried in a mechanical roller-type veneer dryer. Average drying schedules for aspen veneer are presented in table 4. This same schedule gave good results with hybrid poplar veneer. The hybrid poplar, grown in Iowa, had a lower moisture content before drying, however, and could be dried in slightly less time than the aspen.

Aspen and hybrid poplar veneer dried fairly flat with buckling only around areas of irregular grain and of tension wood. Splits present in the green veneer did not lengthen on drying. There was no degrade during drying of the veneer.

Areas of loose fibers or of fuzziness in the veneer were more subject to buckling than was smoothly cut veneer. This was probably caused by the localized occurrence of tension wood fibers.

Some commercial operations have reported collapse in areas of mineral streak, but this was not a problem in the veneer dried at the Laboratory.

Some wet spots were present in the veneer after drying, apparently because of the difference in moisture content of the sheets of veneer before drying.

Average tangential shrinkage of the aspen veneer, based on green dimensions, was 6 percent.

Veneer Quality and Yields

Rotary-cut veneer at the Laboratory showed a 27 percent overrun based on the Scribner Decimal C log scale. This was due to the very careful clipping and handling and also to the small diameters where the board-foot scale was very low. This overrun probably could not be attained commercially. The yield of sliced veneer from two hybrid poplar flitches was 15 percent less than the green log scale. Thirty seven percent of the rotary-cut aspen veneer was face grade, 20 percent was sound back, 42 percent was reject back, and 1 percent was waste. Cutting to smaller core diameters increased total yield but decreased the percentage of better grades because of the greater number of knots near the pith of the rotary-cut bolts.

Uses

Aspen has definite possibilities as a veneer wood. It is being used successfully in several commercial operations. Operations that are equipped to handle small logs, that can cut to small core diameters, and that have outlets for more than one grade of veneer are in an advantageous position to use aspen logs.

Tests at the Forest Products Laboratory show the high incidence of figure in some hybrid poplar may make this veneer valuable as a decorative material in paneling. Sample panels have been made at the Laboratory, and it was noted that the figure effect was heightened by the contrast of the white sapwood and light brown heartwood.

Literature Cited

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(3) Fleischer, H. O.
1949. Experiments in Rotary Veneer Cutting. Proceedings, Forest Products Research Society 3: pp. 137-155.

(4) Garland, Hereford
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(5) Miller, D. G.
1953. Veneer Cutting Properties of Canadian Aspen. Wood (British) pp. 253-256, July.

(6) Pillow, Maxon Y.
1953. Effects of Tension Wood in Hardwood Lumber and Veneer. Forest Products Laboratory Report No. R1943.

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1955. Wood Handbook. U. S. Dept. of Agriculture, Agriculture Handbook No. 72, p. 234.

Table 1.--Description of veneer logs tested

Species	Source of logs	Trees represented	Number of bolts or flitches	Lengths of bolts or flitches	Average diameters at small end of bolts	Average pith eccentricity	External defects	Range or average rings per inch	Average age	Average specific gravity[1]	Moisture content
				Feet	Inches	Inches			Years		Percent
Populus grandidentata Hybrid cross											
plus P. alba[2] Shimek	Van Buren County, Iowa	3	4	3	8.3	.....	Knots, knot indicators	7.6	26	0.37	.....
plus P. alba[2] Sherrill	Van Buren County, Iowa	2	5	3	11.7	.....	Knots, knot indicators, wavy grain	4.6	32	.33	.....
plus P. alba Cranden	Lee County, Iowa	2	2	5.5	11.25	1	Knots, knot indicators, increment borer holes, slight crook, slight wavy grain	2-10	25	.35	40-91
Populus charkowiencis Hybrid cross											
plus P. robusta	Berkshire County, Massachusetts	1	3	4	18.5	1	Slight spiral grain, insect tracings, blue stain, scars, canker, overgrown knots, spike knots	1.5	15	.30	167-175
plus P. caudina	Berkshire County, Massachusetts	1	1	4	16.5	0	Insect tracings, seam, canker, blue stain, overgrown knots	2	15	.27	167
Populus tremuloides	Cass, Lake, and Itasca Counties, Minnesota	9	53	2-4	9.3	.....	Rotten core knots, slight crook, ring shake, insect holes	6-12	53	.....	33-127

[1] Based on green volume and ovendry weight.

[2] Paul, Benson H. Specific Gravity of Populus Species and Hybrids. Forest Products Laboratory Report No. 2060, 1956.

Table 2.--Lathe settings used to cut aspen veneer at room temperature

Veneer thickness	Pressure bar settings		Knife angle
	Vertical	Horizontal	
Inches	Inches	Inches	Degrees
1/20	0.012	0.044	90 to 93
1/16	.014	.055	90 to 92
1/8	.026	.115	89°30' to 90°30'

Table 3.--Slicer settings used to cut hybrid poplar veneer

Veneer thickness	Pressure bar settings		Knife angle	
	Vertical	Horizontal		
Inches	Inches	Inches	Deg.	and Min.
1/28	0.030	0.030	90	25
1/20	.035	.044	90	25
1/16	.035	.052	90	20
1/4	.035	.235	90	15

Table 4.--Drying schedules for aspen veneer

Veneer thickness	Dryer temperature	Time of drying	Average final moisture content
Inches	Degrees F.	Minute	Percent
1/20	320	6	2-4
1/16	320	8	2-4
1/8	320	16	2-4